

REMARKS

I. Status of Claims

Claims 20-41 are pending and are under consideration in the present application. Claims 20 and 30-41 remain rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Additionally, claims 20-41 remain rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 20, 25, 28-30 and 38 remain rejected under 35 U.S.C. §102(a) as anticipated by NCBI ENTREZ ACCESSION NO: gi:10039473.

Claims 20-26, 28-30 and 38 remain rejected under 35 U.S.C. §102(b) as anticipated by NCBI ENTREZ ACCESSION NO: gi:1931504.

II. Response to the Rejection of Claims 20 and 30-41 Under 35 U.S.C. §112, First Paragraph

The Patent Office has maintained its rejection of claims 20 and 30-41 under 35 U.S.C. §112, first paragraph as "containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention." *Official Action*, page 2. Applicants respectfully traverse the rejection and submit the following comments.

The thrust of the Patent Office's rejection of the claims appears to be that "the instant disclosure provides a description of structure with no correlation at all of structure with function." *Official Action*, page 3. More particularly, the Patent Office appears to be arguing that the claimed genus, which encompasses polynucleotides that hybridize to a polynucleotide of the present invention and sequences that are 70% identical to the claimed sequence, is not adequately described because "the ability to hybridize or 70% identity at the nucleic acid level cannot be reliably correlated with the true function of the molecule." *Official Action*, page 3.

In response to applicants' argument that the primary sequence of the claimed polynucleotide is itself a relevant identifying characteristic, the Patent Office contends that the

primary sequence of a nucleic acid "is a relevant identifying characteristic only insofar as that structure can be correlated with a function." *Official Action*, page 3. Applicants submit that the function of the claimed sequence has been established, for example, by the homology of the claimed sequence with other sequences. Examples of the homology of the claimed sequence with other sequences are presented at various points in the specification, such as in Figure 4 and on page 20, lines 7-21. It is applicants' position, therefore, that since applicants supply a function for the claimed sequences via homology to other sequences, the primary sequence of the claimed polynucleotide is, itself, a relevant identifying characteristic.

Continuing, the Patent Office contends the specification provides only a "general teaching of amino acid substitutions considered in the art to be conservative, one of ordinary skill in the art understands that the effect of amino acid substitution at any given position in a polypeptide on the function of that polypeptide is unpredictable." *Official Action*, page 4. Applicants again respectfully submit that, in this regard, the Patent Office is not affording due deference to the level of skill of one of ordinary skill in the pertinent art. Contrary to the Patent Office's assertion, applicants submit that coupled with the knowledge that the claimed sequence encodes a novel potassium channel beta subunit, one of ordinary skill in the art would readily appreciate certain substitutions that would provide a polynucleotide sequence consistent with the asserted function. After considering the nature of a given substitution (e.g., whether a substitution is a conservative or non-conservative substitution, or is selected from the continuum between conservative and non-conservative substitutions) and the location in the primary nucleotide sequence of the substitution, one of ordinary skill in the art can eliminate much of the unpredictability the Patent Office suggests. Applicants again note that the specification teaches conservative and non-conservative substitutions, and many algorithms are known to those of ordinary skill in the art for designing substitutions and predicting the effects of such mutations.

In view of applicants' disclosure of the claimed polynucleotide sequences, applicants' supported assertion that the claimed polynucleotide encodes a potassium channel beta subunit and other disclosure provided in the specification, is it applicants' position that one of ordinary skill in the art would believe that applicants were in possession of the claimed invention at the time the application was filed. Accordingly, applicants respectfully submit that claims 20 and 30-41 are in full compliance with the written description requirement of 35 U.S.C. §112, first paragraph, and request that the rejection of these claims be reconsidered and withdrawn.

III. Response to the Rejection of Claims 20-41 Under 35 U.S.C. §112, First Paragraph

The Patent Office rejected claims 20-41 under 35 U.S.C., §112 first paragraph "as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention." *Official Action*, page 4.

Generally, the Patent Office argues that the homology data applicants provide does not support applicants' contention that the claimed polynucleotide encodes a potassium channel beta subunit. Applicants counter, however, that the Patent Office's rejection of the claims is narrowly focused on the lack of identity between the human Maxi-K potassium channel beta subunit and the claimed sequence. Applicants note that these two sequences share 37.5% similarity. Further, applicants note that Figure 4 provides additional homology data for a range of other sequences, including human potassium channel K+Hnov27 protein, human potassium channel K+Hnov28 protein and human KIAA1317 protein, as well as for several *C. elegans* and *Drosophila* sequences.

Next, the Patent Office apparently argues that the specification lacks any teaching that would enable one of ordinary skill in the art to use the claimed invention. Applicants again submit that the specification provides guidance for cloning the claimed sequences, expressing a polypeptide encoded by the claimed sequences, carrying out bioinformatics operations, identifying the presence of an abnormally high or low level of expressing a polypeptide encoded by the claimed sequences, and tissue profiling, which comprise the applications identified in the Official Action. Applicants again submit that the claimed sequences encode a potassium channel beta subunit, and, therefore, that the noted applicants provide those of ordinary skill in the art more than an opportunity to "find out how to use [the invention] for themselves." *Official Action*, page 7, citing *In re Gardner, Roe & Willey*, 166 U.S.P.Q. 138. To the contrary, applicants submit that those of ordinary skill in the art would recognize the merit of applicants' assertion that the claimed sequences encode a novel potassium channel beta subunit, and in view of the above-referenced guidance provided in the specification, would be fully enabled to carry out these applications.

Continuing, applicants submit that the same argument applies to the Patent Office's position that the cited uses of developing diagnostic protocols and/or therapeutics. More specifically, applicants submit that an appreciation that the claimed sequences encode a novel

potassium channel beta subunit, coupled with no more than routine experimentation, would enable those of ordinary skill in the art to develop therapeutics and/or diagnostics. Clearly, the guidance provided in the specification transcends the "blind trial and error experimentation" urged by the Patent Office regarding the development of therapeutics and/or diagnostic protocols.

Applicants now address the Patent Office's comments regarding Examples 19 (antibody formation), 23 (method of determining alterations in a gene), 24 (method of detecting abnormal levels of a polypeptide in a biological sample) and 31 (method of generating a transgenic animal). It appears that the Patent Office generally contends that unless a function for the claimed sequence is provided, those of ordinary skill in the art would not know what to do with data generated in accordance with these examples.

Applicants again submit that in view of the teachings of the specification, coupled with applicants' assertion that the claimed sequences encode a novel potassium channel beta subunit, which is supported by the homology information provided in Figure 4 and throughout the specification, one of ordinary skill in the art would be fully enabled to practice the invention as claimed. It is applicants' position that, contrary to the Patent Office's assertion, the use of data generated in accordance with the cited examples would be apparent to those of ordinary skill in the art and would be of use in the same way such data is useful with regard to other proteins. For example, a transgenic animal expressing the potassium channel beta subunit of the present invention could be used to evaluate a candidate therapeutic. Antibodies to a polypeptide encoded by the claimed sequence, for example, could be useful in antibody-based therapies, immunophenotyping procedures and protein purification operations. The ability to make a determination as to the presence or absence of a mutation in the claimed sequence can contribute, for example, to a method of a diagnosing condition associated with potassium channels and potassium channel disorders, such as myokymia, long QT syndrome, epilepsy, and Bartter's syndrome (see, e.g., page 21, lines 6-8, and page 1, lines 26-29).

In its rejection of claim 34, the Patent Office argues that Example 6, which discloses RNAi data supporting applicants' contention that the potassium channel beta subunit of the present invention, does not support the scope of claim 34. The Patent Office argues the data presented in Example 6 "must be extrapolated not only from a polynucleotide encoding a protein having only 24% identity, but also from data obtained in insect cells to the a mammalian

organism.” *Official Action*, page 9. Respectfully, applicants maintain their position that the data in Example 6 supports applicants’ claim to a method of diagnosing a disease associated with a mutation associated in a claimed sequence. The extrapolation identified by the Patent Office relies on established scientific principles and can be considered in conjunction with other supporting data, such as the homology data presented in the specification. Applicants maintain the position that, taken alone or with other data presented in the specification, one of ordinary skill in the art would appreciate that the RNAi results presented in Example 6, as well as data presented throughout the specification, support claim 34. It is also applicants’ position that, in view of the data presented in the specification, nothing more than routine experimentation would be required to determine the presence or absence of a mutation in a sequence of claim 20; consequently, a diagnosis can readily be made, based on an evaluation of the generated sequencing data.

Lastly, in its rejection of claim 38, the Patent Office contends the recitation of the use of a CLUSTALW alignment for determining percent identity, and associated discussion in the specification, is not enabling because the Patent Office contends this guidance “serves only to investigate the claimed invention.” *Official Action*, page 9. Respectfully, applicants disagree. Applicants submit that the recitation of the precise algorithm by which a percent identity can be determined, coupled with the discussion of the use of the algorithm presented in the specification, provides all guidance that would be useful to one of ordinary skill in the art when practicing claim 38 as claimed. Contrary to the Patent Office’s position, claim 38 does not represent a situation in which the only patentable utility of the claim is to investigate the present invention. As applicants have argued throughout, the function of the claimed sequence is as a novel potassium channel beta subunit. In view of this contention and the recitation of the use of CLUSTALW to determine percent identity, applicants believe claim 38 is fully enabled and in compliance with the requirements of 35 U.S.C. 112.

Applicants finally submit that no undue experimentation would be required to practice any of the above-referenced aspects of the present invention. As argued in the previous response (Paper 13), explicit guidance is provided in the specification, and can be coupled with the high level of skill in the related arts. Guidance is provided in the form of the stated function of the claimed sequence, as well as the extensive disclosure of the specification. Additionally, the Patent Office has identified the level of skill in the art as “very high.” *Official Action* (Paper No.

10), page 9. Applicants submit that alone or together, these points support applicants' position that nothing beyond the application of routine techniques would be required to practice the invention commensurate with the claims.

Applicants submit that claims 20-41 are in full compliance with the enablement requirement of 35 U.S.C. §112, first paragraph, and respectfully request that the rejection of claims 20-41 under 35 U.S.C. §112, first paragraph, be reconsidered and withdrawn. Applicants further submit that claims 20-41 are in condition for allowance and respectfully solicit the same.

IV. Response to the Rejection of Claims 20, 25, 28-30 and 38 Under 35 U.S.C. §102(a)

The Patent Office has rejected claims 20, 25, 28-30 and 38 under 35 U.S.C. §102(a) as anticipated by NCBI ENTREZ ACCESSION NO: gi:10039473. Applicants have considered the Patent Office's comments in the Final Rejection. Applicants respectfully traverse the rejection and submit the following comments.

Applicants have amended claim 20 to recite the element of an isolated nucleic acid molecule *consisting of* a polynucleotide sequence selected from the recited group. Applicants submit that in view of this amendment to claim 20, the cited sequence, gi:10039473, does not disclose the sequences claimed in the rejected claims and therefore does not anticipate claims 20, 25, 28-30 and 38. Applicants therefore respectfully request that the rejection of these claims under 35 U.S.C. §102(a) be reconsidered and withdrawn. Applicants further submit that claims 20, 25, 28-30 and 38 are in condition for allowance and respectfully solicit the same.

V. Response to the Rejection of Claims 20-26, 28-30 and 38 Under 35 U.S.C. §102(b)

The Patent Office has rejected claims 20-26, 28-30 and 38 under 35 U.S.C. §102(b) as anticipated by NCBI ENTREZ ACCESSION NO: gi:2133864. Applicants respectfully traverse the rejection and submit the following comments.

Applicants have amended claim 20 to recite the element of an isolated nucleic acid molecule *consisting of* a polynucleotide sequence selected from the recited group. Applicants submit that in view of this amendment to claim 20, the cited sequence, gi:2133864, does not disclose the sequences claimed in the rejected claims and therefore does not anticipate claims 20-26, 28-30 and 38. Applicants therefore respectfully request that the rejection of these claims

under 35 U.S.C. §102(a) be reconsidered and withdrawn. Applicants further submit that claims 20-26, 28-30 and 38 are in condition for allowance and respectfully solicit the same.

VI. Conclusions

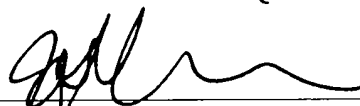
In light of the above amendments and remarks, applicants submit that the subject patent application is in condition for allowance and courteously solicit a Notice of Allowance.

If any small matter should remain outstanding after the Patent Examiner has had an opportunity to review the above Remarks, the Patent Examiner is respectfully requested to telephone the undersigned patent attorney in order to resolve these matters and avoid the issuance of another Official Action.

Although it is believed no additional fee is due, the Commissioner is hereby authorized to charge any deficiency or credit any overpayment associated with the filing of this correspondence to Deposit Account Number 19-3880.

Respectfully submitted,

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